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Double re-entrance of superconductivity in superconductor/ferromagnet bilayers

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Abstract

We report on the first observation of a double suppression of superconductivity in a superconductor/ferromagnet layered system. The result was obtained using a superconductor/ferromagnetic-alloy bilayer of Nb/Cu 41Ni59 with dNb 6.2 nm. As the thickness of the ferromagnetic alloy gradually increases, the superconducting transition temperature Tc drops sharply until a complete suppression of superconductivity is observed at dcuNi 2.5 nm. At further increase of the Cu41Ni59 layer thickness, superconductivity restores at dcuNi 24 nm. Then, with a subsequent increase of dcuNi, superconductivity vanishes again at dcuNi 38 nm. Our experiments give evidence for the realization of the quasi-one dimensional Fulde-Ferrel--Larkin-Ovchinnikov (FFLO) like state in the ferromagnetic alloy layer. © 2009 IOP Publishing Ltd.

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